WO 094015841 A1
JUL 1994
ITELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :
B65B 63/08, 25/22, B65D 81/38 // F25D 3/12

A1

(11) International Publication Number: WO 94/15841

(43) International Publication Date: 21 July 1994 (21.07.94)

(21) International Application Number: PCT/NO94/00008

(22) International Filing Date: 10 January 1994 (10.01.94)

(30) Priority Data:

930094	12 January 1993 (12.01.93)	NO
932832	9 August 1993 (09.08.93)	NO

(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.
In English translation (filed in Norwegian).

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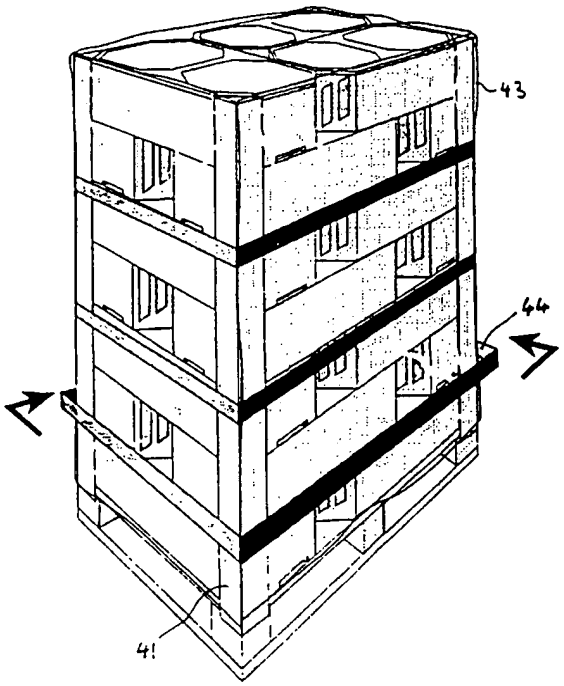
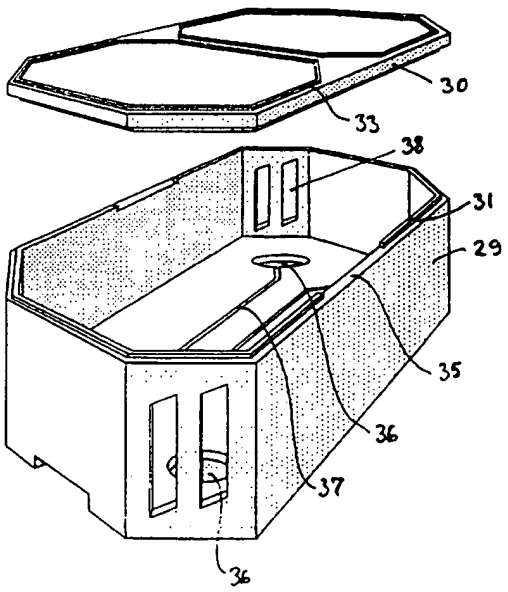
(54) Title: A METHOD AND A DEVICE FOR HANDLING OF FRESH FISH DURING TRANSPORTATION AND STORAGE





(57) Abstract

A method and transportation case for the handling of fresh fish during transportation and storage, wherein the fish is packed in cases and stacked on a pallet (40), and where the cases (29) have holes for supplying carbon dioxide from the dry ice (41, 49), and where the cases in a stack are enveloped by a gas bag (43) which is ventilated at the bottom.

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A METHOD AND A DEVICE FOR HANDLING OF FRESH FISH DURING TRANSPORTATION AND STORAGE

The present invention relates to a method for the handling of fresh fish during transportation and storage, wherein the fish is packed in cases and stacked on a pallet. The invention also relates to a device for stackable transportation cases for fresh fish.

In the conventional packing of fresh fish, in particular for export, the fish are normally slaughtered and packed on the same day that the transportation leaves the slaughterhouse. This means that the production or the slaughter is irregular, often with several shifts on some weekdays, whilst on other days, e.g., Fridays, there is no slaughter at all. This method is due to the short "life-time" of the fish in a fresh condition (6 to 8 days after slaughter). The duration of transportation when hauling to countries overseas is estimated to be two to four days. Refrigerated trucks are used as the means of transportation.

In this known method, the fresh fish is packed in cases of monoplastic or corrugated cardboard with a maximum weight of 30 kg. Of this weight fish constitutes approx. 22 kg and flat ice 7 to 8 kg. Some 18 to 27 cases are packed per pallet and everything is palletized.

A major disadvantage of this known method is that to complete the same load the haulage truck often loads up at several production plants, thereby creating the conditions for possible transfer of infection from one plant to another. This is a considerable veterinary-medical problem.

German authorities are planning to introduce requirements for the transportation of fresh fish which call for the means of transportation to be equipped such that the melt water from the

flat ice is collected (approx. 7 to 8 tonnes per vehicle). With the technique used today, this melt water runs out of the vehicle during transportation, thus representing substantial pollution of the environment and a potential source of infection.

If the regulations as suggested are put into effect, this will entail large investments per vehicle, which will in turn mean additional costs for the consumer.

Thus, one of the objectives of the present invention is to lengthen the storage life of fresh fish substantially, preferably to more than twice today's normal storage life. A further objective is to avoid spillage of waste water from the haulage trucks, thereby avoiding the transportation of potential infection from one fish farm to another via vehicles of this kind. It is also an objective to obtain cost-related improvements.

Additional objectives of the invention are to increase the net weight of fish by as much as 20% per case, reduce the transportation costs by as much as 20%, and spread the slaughtering process evenly throughout the entire week.

The method mentioned in the introduction is characterized according to the invention in that:

a) a container containing dry ice is placed at the four corners of the stack of cases, e.g., by means of hook attachment, snap-on attachment, glue or by using tape, the container which has openings facing in towards the stack of cases being arranged in such a way that said openings correspond with similar holes in the adjacent case corner in the stack of cases, and

b) a downwardly open gas bag is drawn down over the stack of cases and the mounted dry ice containers, so that the opening of the bag is roughly level with the top surface of the pallet.

As an alternative, the method is characterized in that:

a) each case with its respective lid, if any, before it is stacked, is provided with an amount of dry ice in a chamber designed for this purpose in each corner of the case so that carbon dioxide can seep into the case, and

b) a downwardly open gas bag is drawn down over the stack of cases, so that the opening of the bag is roughly level with the top surface of the pallet.

According to a further embodiment of the first alternative method, the stack of cases, the dry ice containers and the enveloping gas bag are bound up with straps, tape, shrink film, stretch film or similar.

According to a further embodiment of the second alternative method, the stack of cases and enveloping gas bag are bound up with straps, tape, shrink film or similar.

According to yet another embodiment of the methods, prior to the cases being stacked, a small amount of crushed ice is placed in a known way per se, e.g., in each case.

Furthermore, it would be advantageous if the stack of cases cooled by means of dry ice and enveloped by the gas bag were transported to the recipient in ventilated cold storage, and the recipient were to remove the gas bag and any residual dry ice.

The device mentioned in the introduction is characterized in that it comprises a case with a storage chamber, where each corner of said chamber is chamfered and made in the form of a wall portion provided with holes, the holes being arranged in such a way as to enable the carbon dioxide from the dry ice to flow through said holes.

According to a further embodiment, the device can be equipped with a dry ice container which is designed to have openings which form a connection with the holes in a wall portion of the

case.

It would be an advantage if the dry ice container were of a height that corresponds to the height of at least one case. Alternatively, the dry ice container can be of a height equivalent to one stack of cases, the dry ice container having openings which correspond with holes in the adjacent corner of the cases in the stack.

In one embodiment, the corners of the case can each have a dry ice chamber for the accommodation of a dry ice element, said wall portion forming one wall of said chamber.

Furthermore, it is of advantage if the dry ice container or said dry ice chamber is triangular in cross-section.

In one preferred emdodiment, the inside of the case is octagonal in form. This has the advantage that the fish lie flat in the case, whilst the volume of the case is used to the full.

In a second preferred embodiment, it is also of advantage if the outside of the case is octagonal. This is particularly so when using dry ice containers that are mounted the outside of the case or stack of cases, and also that the solution allows for the transfer of gas between the cases.

It is of advantage if a type of case can be used where the bottom of the case is watertight and provided with upwardly open drainage channels, and where the bottom also has liquid-collecting depressions into which said channels open.

Moreover, it can be of advantage to allow at least two of said depressions to be connected to one another via a drainage channel.

By means of the invention, a dry ice container is provided for

mounting on the outside of the transportation case or on the outside of a stack of such cases. According to the invention, the dry ice container is characterized in that it is roughly triangular in cross-section, with a closed bottom and a closable top, and where one surface of the container (the hypotenuse of the triangle) is provided with a number of openings for the emission of carbon dioxide, and where the two other surfaces (the legs of the triangle) have a portion that extends past the first-mentioned surface at an angle thereto and in such a way that said portion lies adjacent to the corresponding wall portion of a case.

What is achieved by means of the present method is that fish can be packed as is usual per se, but with a 15-20% higher net product weight per case. This results in a reduction in transportation costs of between 15 and 20%.

By using dry ice as a cooling agent together with a minimum amount of flat ice, instead of flat ice only, one achieves the considerable advantage that there is no drainage of melt water into the surrounding environment of the haulage truck, and thus nor is there any need for investment in a collection means. Any waste water will be collected in said depressions in the bottom of the case. The dry ice can be packed in four separate, vertically positioned containers in each corner of the pallet, or the transportation cases can be provided with a separate chamber for dry ice (i.e. there is no contact between the fish and the dry ice). Separate chambers of this kind for dry ice can be made either by means of a specially designed case or by providing triangular storage chambers for dry ice in each corner of the transportation case.

Moreover, the invention enables one to use a modified slaughter/production procedure at the fish farms in that production can be operated more regularly and in one shift, instead of three shifts two days a week and standstill the rest of the week.

The invention will now be described in detail with reference to the enclosed drawings.

Fig. 1 shows a first, simplified embodiment of a case for the storage and transportation of fresh fish.

Fig. 2 shows the stacking of cases as illustrated in Fig. 1 on a pallet, and

Fig. 3 shows the cases stacked on the pallet.

Fig. 4 shows a first embodiment of dry ice containers for mounting on the corners of a stack of cases, according to the invention.

Fig. 5 shows a detail of a possible method of mounting a dry ice container on the corners of a stack of cases.

Fig. 6 illustrates the stack of cases enveloped by a gas bag.

Fig. 7 shows an alternative embodiment of the case in Fig. 1.

Figs. 8 and 9 show an alternative embodiment of the case in Fig. 1.

Fig. 10 illustrates a palletized stack of cases of the type that is illustrated in Figs. 8 and 9.

Figs. 11, 12 and 13 show the stack of cases in Fig. 10 whilst a gas bag is being put on, and a first and second method of binding up the stack of cases with its dry ice containers and gas bag, respectively.

Fig. 14 shows a detail of the mounting of a dry ice container on a stack of cases.

Figs. 15, 16 and 17 show an unfolded dry ice container according to the invention, from the front and in perspective

from behind, respectively.

Fig. 18 shows the dry ice container whilst being filled with dry ice.

The invention will now first be explained with reference to a simplified form of the case as illustrated in Figs. 1 and 7.

The fish is placed in a case 1 which at each corner is chamfered and provided with a wall portion 2 which has a plurality of holes 3. Once the case 1 has been filled with fish, a lid 4 is placed on the case. The lid 4 is preferably of the same form as the case 1, although slightly larger in size so that the lid can be drawn down around the case 1. The lid 4 also has chamfered corners with corresponding wall portions 5 provided with holes 6, the holes 3 and 6 corresponding with one another when the lid 4 is placed on the case 1.

According to a possible, although not for the time being preferred, embodiment of the invention, a gas bag is placed on the pallet 7. For the sake of simplicity, this gas bag is not shown in Figs. 2, 3 and 4, but is shown in Fig. 6. However, it will be understood that the gas bag 8 must be placed on the pallet prior to the cases being stacked on the pallet. In order to be able to maintain a controllable gas pressure in a closed gas bag, preference is given to using a pressure reducing valve or to having the bag made of a plastic sheet that allows the passage of controlled amounts and types of gases, so that the maximum gas pressure in the gas bag is approx. 115% of atmospheric pressure. The reducing valve in Fig. 6 is indicated by means of the reference numeral 9.

The fish is packed in the cases at the same or a higher product weight than is possible conventionally. Thereafter the cases are stacked on the pallet, i.e. on the bottom of the gas bag, in the desired number of layers, preferably seven layers. As

shown in Fig. 2, it is advantageous to stack the cases in bond formation in order to ensure that the stack is stable. In this connection, the gas bag is not closed, nor is it necessarily drawn up along the pallet.

Prior to loading the truck, dry ice containers 10, 11 are coupled to the respective corners of the stack of cases, as shown in Fig. 4. The containers are preferably triangular in cross-section and are filled with dry ice. A wall 12 of the dry ice container is provided with holes 13 which correspond to the respective holes 3, 6 in the case and its lid. Two or more of the holes, in Fig. 5 designated by the reference numeral 14, can be partially punched out, in such a way that a tab is thereby formed, the tab 15 being capable of being made to engage with said holes 6, 3 in the case containing fish. In Fig. 5 said holes 6, 3 are, for ease of reference, designated by a common reference numeral 16. The bag is thereafter drawn up and is closed in that the top of the bag is rolled around a bar 17, whereupon clamps 18, 19 fasten the bag to the bar 17 and prevent it from loosening from said bar. As an alternative, the bag can be welded at the top by means of a welding iron, in which case said bar 17 and the clamps 18, 19 are not required.

Should it be necessary to change the dry ice elements at a transit location, the solution illustrated in Fig. 6 with the bar 17 and the clamps 18, 19 would be preferable. In this instance the gas bag is opened, whereupon new dry ice containers can be mounted.

The pallets loaded with cases are tranported to the recipient with the bags closed, but with regulated pressure. A ventilated cold storage chamber in used in the haulage truck.

When the consignment arrives, the recipient removes the gas bag, and any residual dry ice is taken out.

In an alternative solution, the slaughtered fish is packed in the type of case shown in Fig. 7 and designated by the reference numeral 20. The case 20 can be provided with a conventional lid 21 which fits around the periphery of the case.

After the fish has been packed in case 20, it is chilled, e.g., in a cold storage room, whereupon dry ice 22 is put in a chamber 23 that is designed for this purpose in each corner of the case. Each corner of the storage chamber in the case is chamfered, in the same way as for the embodiment in Fig. 1, and is provided with a wall portion 24 which has holes 25 for the passage of carbon dioxide from the dry ice 22. As mentioned in connection with the exemplary embodiments in Figs. 1 to 6, a gas bag 8 is placed on a pallet 7. The dry ice 22 is placed in said chamber 23 before the lid 21 is put on the case. Once the cases have been stacked on the bottom of the gas bag which rests on the pallet 7, the gas bag is drawn up and closed in the same way as described in connection with Fig. 6. The pallet of fresh fish is then transported as described above. This type of transportation case is particularly suitable for the instances where the transportation time is short and there is no need to change dry ice elements, or use flat ice in the case together with the dry ice.

In contrast to the solution in Figs. 1 to 6, and with particular reference to Fig. 6, where gas from the dry ice will seep into the cases from the dry ice containers 10, 11 and possibly out through the free standing corners 26, it will be understood that a similar through-flow of carbon dioxide is not possible in the same way with the solution according to Fig. 7. Excess pressure inside the closed case 20 will therefore have to be transmitted into the inside of the bag via ventilation holes 27 in the case and corresponding holes 28 in the lid.

The case and lid 1, 4 and 20, 21 respectively are preferably

made of cardboard, paperboard or monoplastic.

Furthermore, said dry ice container 10, 11 can be made of a similar material. The cases 1, 20 ought preferably to be coated with a plastic material, e.g., polyethylene film. In a similar way, the lids 4, 21 ought to be coated with this material. This ensures that the fish do not come into direct contact with the material of the case.

The type of case structure that is shown in Figs. 1 and 7 respectively could be made of a recyclable material and will exhibit a strength that is greater than that of conventional cardboard cases.

It will be understood that the temperature provided by the dry ice in each case can be varied by using one or more of the four storage chambers 23 in Fig. 7.

Through a further development of the invention, as will now be explained in connection with Figs. 8 to 18, the for the moment preferred embodiment of the method and device according to the invention is shown.

A fish case 29 with a lid 30 is shown in Figs 8 and 9. Both the case and the lid are preferably made of monoplastic, such as polystyrene. The case has ribs 31 along the upper edge for engagement with corresponding grooves 32 on the under-side of the lid. On the upper side of the lid ribs 33 are provided in two octagons for engagement with grooves 34 on the superjacent case or cases. The upper edge of the case may have a break in said rib 31, such that it will be easier to stack the cases in bond formation.

In the bottom of the case there are depressions 36 or "wells" which are designed to be able to hold together approx. 1 to 2 kg of waste water from the flat ice or crushed ice in the case without the fish thus coming into contact with the water, and

without the fish getting large "pressure marks" from the profiles in the bottom of the case. Drainage channels or gutters 37 are also located in the bottom of the case, and one gutter preferably extends between a pair of depressions 36, although as can be readily visualized, all the depressions 36 could linked to each other by means of channels.

To enable the carbon dioxide from the dry ice to seep into the case, the case is provided in each chamfered corner with a pair of holes 38. These holes 38 will lie opposite corresponding openings in the dry ice containers, as will be described in more detail below.

As shown also in connection with Fig. 1, the case is still octagonal in the embodiment according to Figs. 8 to 14. This gives the case superior strength, whilst the carbon dioxide is guaranteed good through-flow through the stack of cases.

With the illustrated engaging ribs and grooves on both the lid and the case, the type of case with respective lid illustrated here is highly suitable for stacking in bond formation.
To facilitate the handling of the cases, there are located at the bottom of each short side cut-outs that form handles 39.

Fig. 10 illustrates a stack of cases with lids placed on a EURO-pallet 40.

In Fig. 11 said stack of cases is shown with mounted dry ice containers 41. To ensure that the dry ice containers cannot easily fall off, if they are not affixed in a way similar to what has been described earlier, they can be secured temporarily by means of a piece of tape 42 or another fixing means, e.g., elastic bands that are fixed to the sides of the adjacent case at one or more points along the length of the dry ice container. Alternatively, an elastic band can be used which holds all four dry ice containers in place. The dry ice containers are filled with dry ice elements, preferably prior

to being attached to the stack of cases. Alternatively, they can be filled immediately after the dry ice container has been positioned and secured.

A bag or pallet hood 43, which is closed at the top and open at the bottom, can be drawn over the stacked pallet, as is shown in Fig. 11. The bag can be made of a plastic material, although other kinds of pallet hood material are possible, e.g., cardboard, paper, plastic-coated paper etc. The bag or pallet hood extends down to the upper edge of the pallet 40.

To ensure that the bag or pallet hood will not slide off or be ripped off during transportation, and to ensure that the pallet and its load are stable whilst being handled, e.g. with a fork lift truck, known per se pallet tighteners 44 (Fig. 12) or stretch film 45 (Fig. 13), optionally shrink film, can be placed around the vertical portion of the load on the pallet.

In the manner illustrated here, the carbon dioxide from the dry ice containers 41 will seep through the cases and out through holes 38 which have no contact with the dry ice container, and thence down and out into the bottom of the stack of cases and out through the openings in the pallet.

When the goods are in this way placed in a refrigerated vehicle for instance, it will generally be necessary to have a certain amount of ventilation from the cold storage chamber in the refrigerated truck because of the excess pressure that is created by the dry ice.

As shall be explained in more detail with reference to Figs. 14 to 18, it will be seen that the dry ice containers or corners 41 can be supplied in an unfolded form, such as is shown in Fig. 15. The bottom 46 of the container 41 is designed to rest against the free portion 40' of the pallet 40 at each corner thereof. At the bottom, the container 41 is provided with downwardly projecting portions or skirts 47 which

ensure sideways stability of the container in relation to the pallet. The fixing tabs 48 at the bottom are secured with self-adhesive glue, staples or by means of a glue gun.

Once the dry ice 49 has been inserted into the container 41, the lid 50 of the container is folded down and optionally secured with, e.g., tape, glue or staples.

In order to ensure good stability of the container 41 and its contents 49 along the cases in the stack and thus simultaneously also a bracing of the stack of cases at the corners upwards from the pallet 40, the wall portions 51 and 52 of the container are fed a little way past the wall 53 of the container 41 which has openings 54 and at an angle in relation to its plane. This means that these parts of 51' and 52' of the wall portions will come to rest against the sides of the stack of cases at the corners thereof. The openings 54 correspond with the positions of the holes 38 in the cases 29.

The dry ice containers can preferably be made of polyethylene-coated corrugated cardboard, and which in full pallet height (for fish) can each contain approx. 14 kg of dry ice. It is of advantage if the dry ice containers are triangular in cross-section.

To obtain sufficient refrigeration, it is desirable to use four dry ice containers 41.

Although the invention has been described in connection with certain embodiments, it will be understood that the invention also comprises technical equivalents of that which is illustrated and described.

Patent claims

1.

A method for the handling of fresh fish during transportation and storage, wherein the fish is packed in cases and stacked on a pallet, characterized in that

a) a container containing dry ice is placed at the four corners of the stack of cases, e.g, by means of hook attachment, snap-on attachment, glue or by using tape, the container which has openings facing in towards the stack of cases being positioned such that said openings correspond with similar holes in the adjacent case corner in the stack of cases, and

b) a downwardly open gas bag is drawn down over the stack of cases and the mounted dry ice containers, so that the opening of the bag comes roughly level with the top surface of the pallet.

2.

A method for the handling of fresh fish during transportation and storage, wherein the fish is packed in cases and stacked on a pallet, characterized in that

a) each case with its respective lid, if any, before it is stacked, is provided with an amount of dry ice in a chamber designed for this purpose in each corner of the case so that carbon dioxide can seep into the case, and

b) a downwardly open gas bag is drawn down over the stack of cases and its respective dry ice containers, so that the opening of the bag comes roughly level with the top surface of the pallet.

3.

The method as disclosed in Claim 1, characterized by the further step :

c) that the stack of cases, dry ice containers and enveloping gas bag are bound up with straps, tape, stretch film, shrink film or similar.

4.
The method as disclosed in Claim 2, characterized by the further step :
c) that the stack of cases and enveloping gas bag are bound up with straps, tape, stretch film, shrink film or similar.

5.
The method as disclosed in one or more of Claims 1 to 4, characterized in that prior to the cases being stacked, a small amount of crushed ice or flat ice, e.g., 1 to 2 kg per case, is placed in the cases in a known way per se.

6.
The method as disclosed in one or more of the preceding claims, characterized in that the stack of cases, enveloped by the gas bag, is transported to the recipient in a cold storage chamber, and that the recipient removes the gas bag and any residual dry ice.

7.
A device for stackable transportation cases for refrigerated fresh fish, characterized in that it comprises a case with a storage chamber, wherein each corner of said chamber is chamfered and made in the form of a wall portion provided with holes, said holes being arranged such that carbon dioxide from the dry ice can flow therethrough.

8.
A device as disclosed in Claim 7, characterized by a dry ice container that is designed to have openings which form a connection with the holes in a wall portion of the case.

9.
A device as disclosed in Claim 8, characterized in that the dry ice container is of a height that corresponds to at least the height of one case.

10.
A device as disclosed in Claim 8, characterized in that the dry ice container is of a height that corresponds to the height of the stack of cases, said dry ice container having openings that correspond with holes in the adjacent corner of the cases in the stack.

11.
A device as disclosed in Claim 7, characterized in that the corners of the case each have a dry ice chamber in which to accommodate a dry ice element, said wall portion forming a wall of said chamber.

12.
A device as disclosed in Claim 8, 9 10 or 11, characterized in that the dry ice container or said dry ice chamber is triangular in cross-section.

13.
A device as disclosed in one or more of the preceding Claims 7 to 12, characterized in that the inside of the case is octagonal in form.

14.
A device as disclosed in one or more of Claims 7 to 10, 12 and 13, characterized in that the outside of the case is octagonal in form.

15.
A device as disclosed in one or more of Claims 7 to 17, characterized in that the bottom of the case is watertight and provided with upwardly open drainage channels, and that it is also provided with liquid-collecting depressions or "wells" into which said channels open.

16.
A device as disclosed in Claim 15, characterized in that at least two of said depressions are connected to each other via a drainage channel.

17.
A dry ice container for a transportation case for fresh fish, characterized in that it is roughly triangular in cross-section, has a closed bottom and a closable top, and where one surface of the container (the hypotenuse of the triangle) is provided with a plurality of holes to allow the emission of carbon dioxide, and where the two remaining surfaces (the legs of the triangle) have a portion which extends past the first-mentioned surface at an angle thereto and in such a way that said portion comes to lie against a corresponding wall portion of a case.

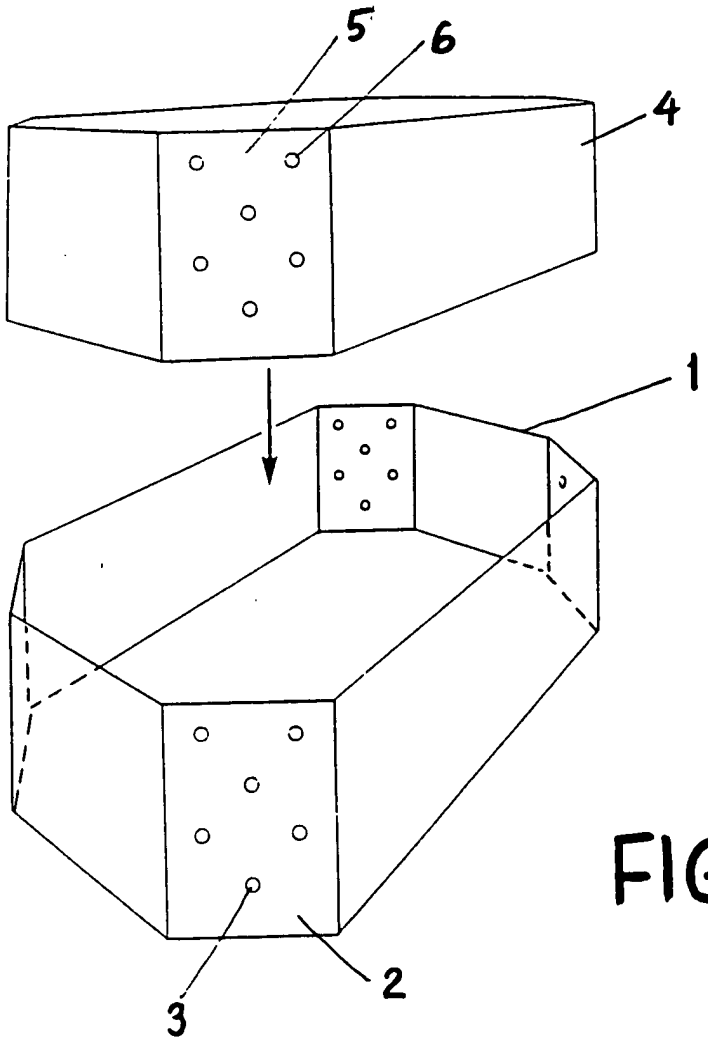


FIG.1

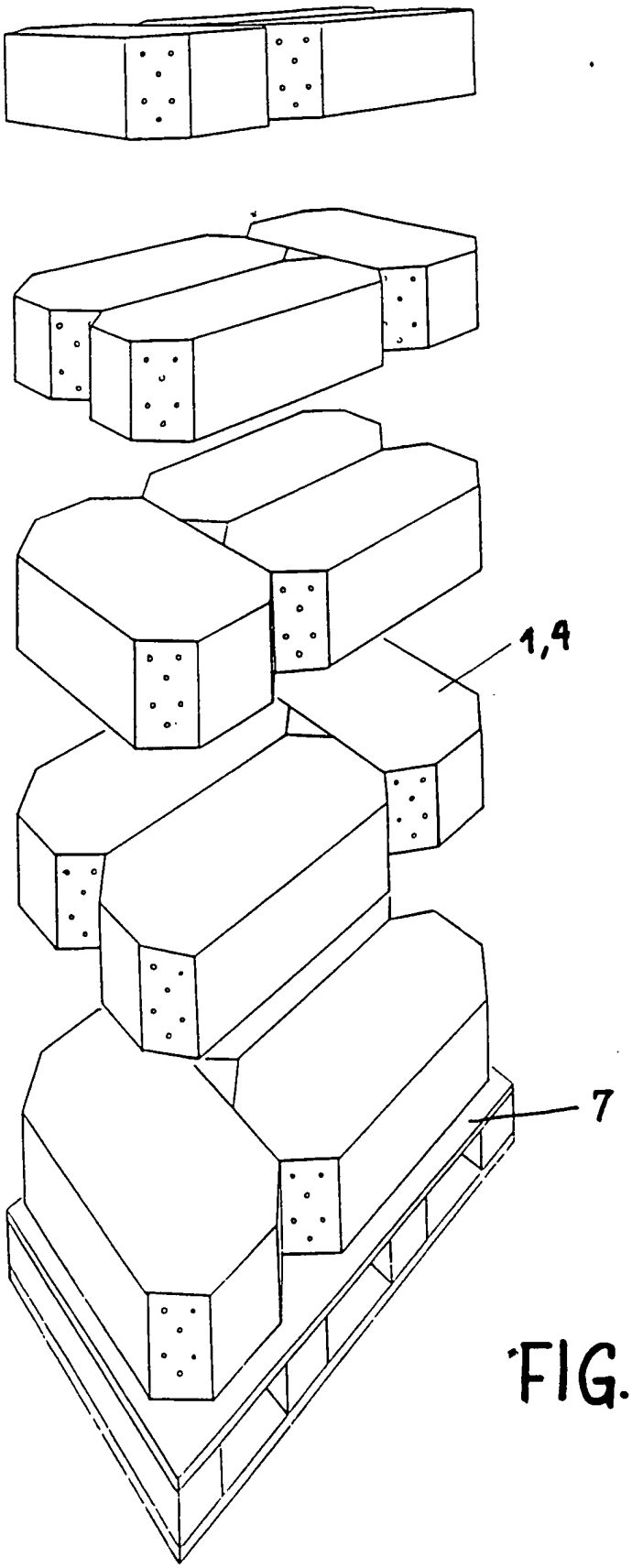


FIG. 2

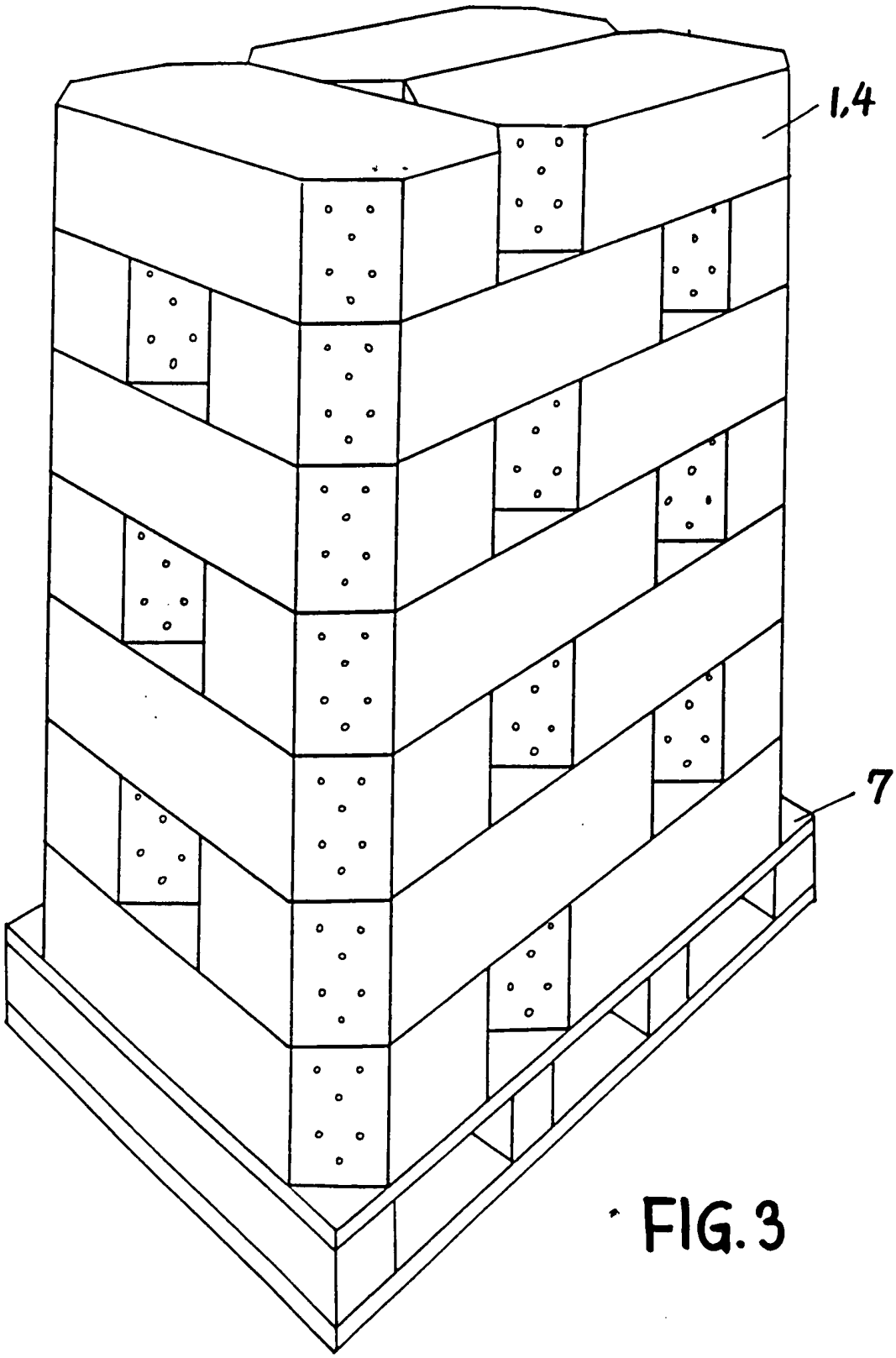


FIG. 3

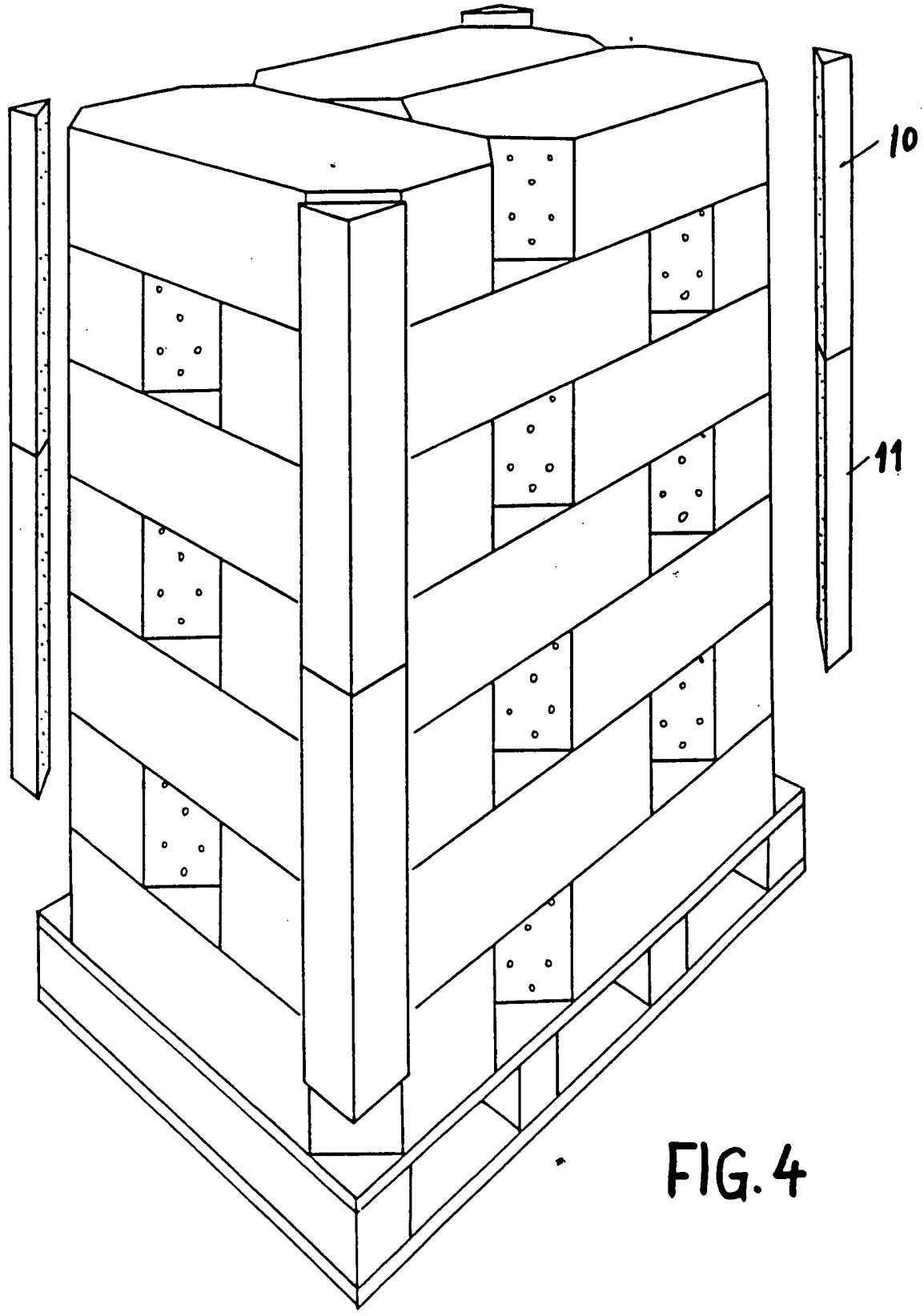
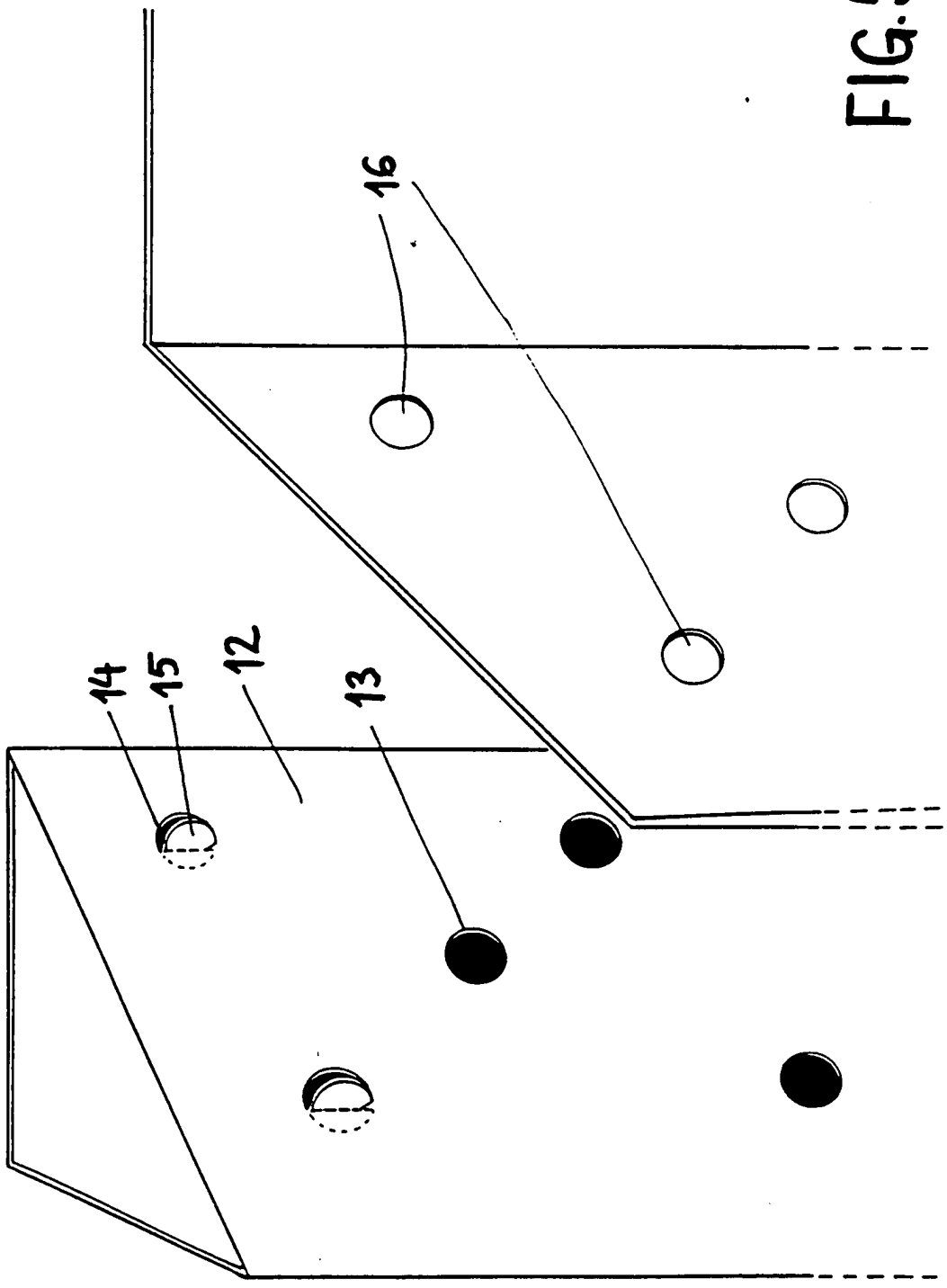


FIG. 4

FIG.5



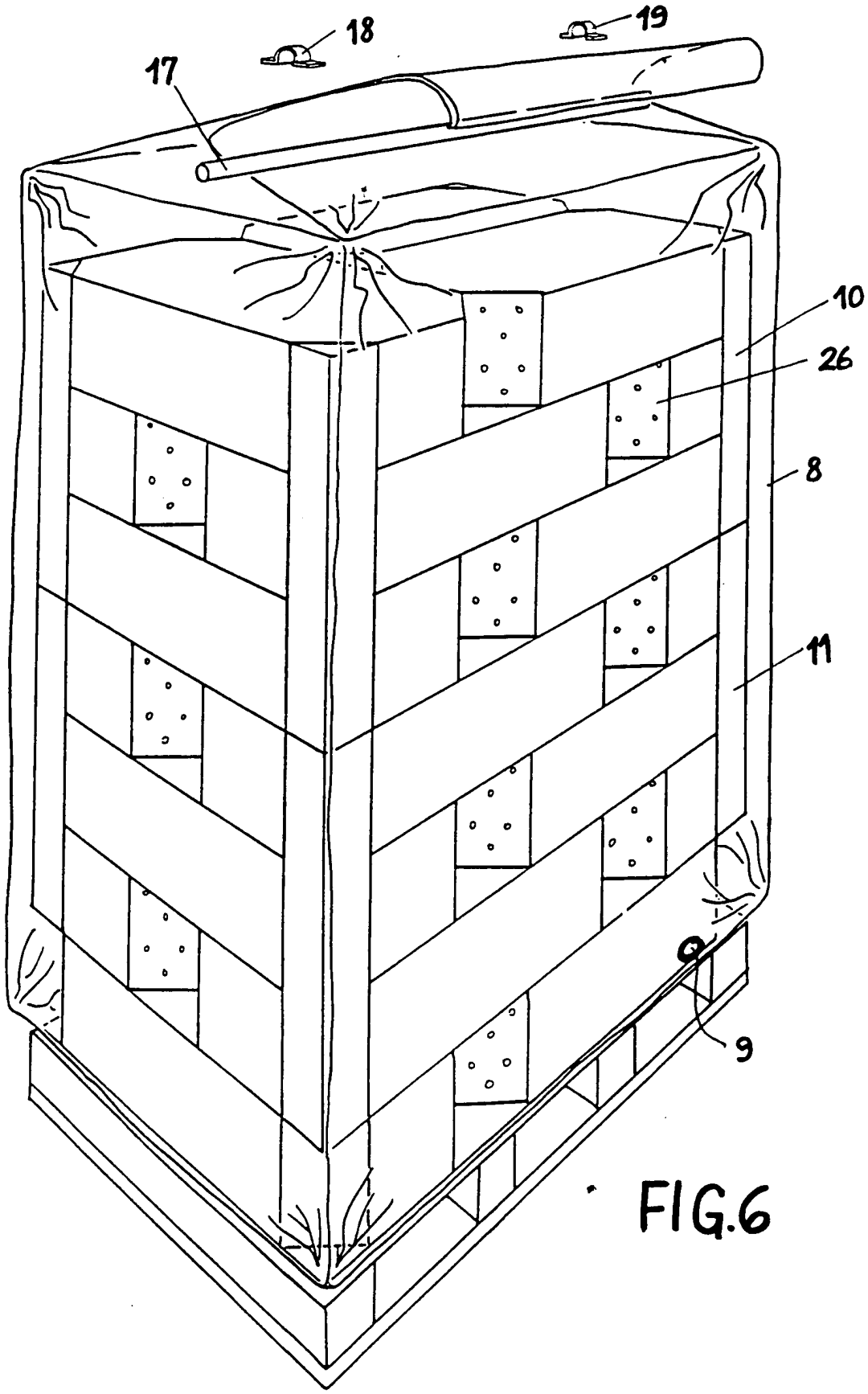


FIG.6

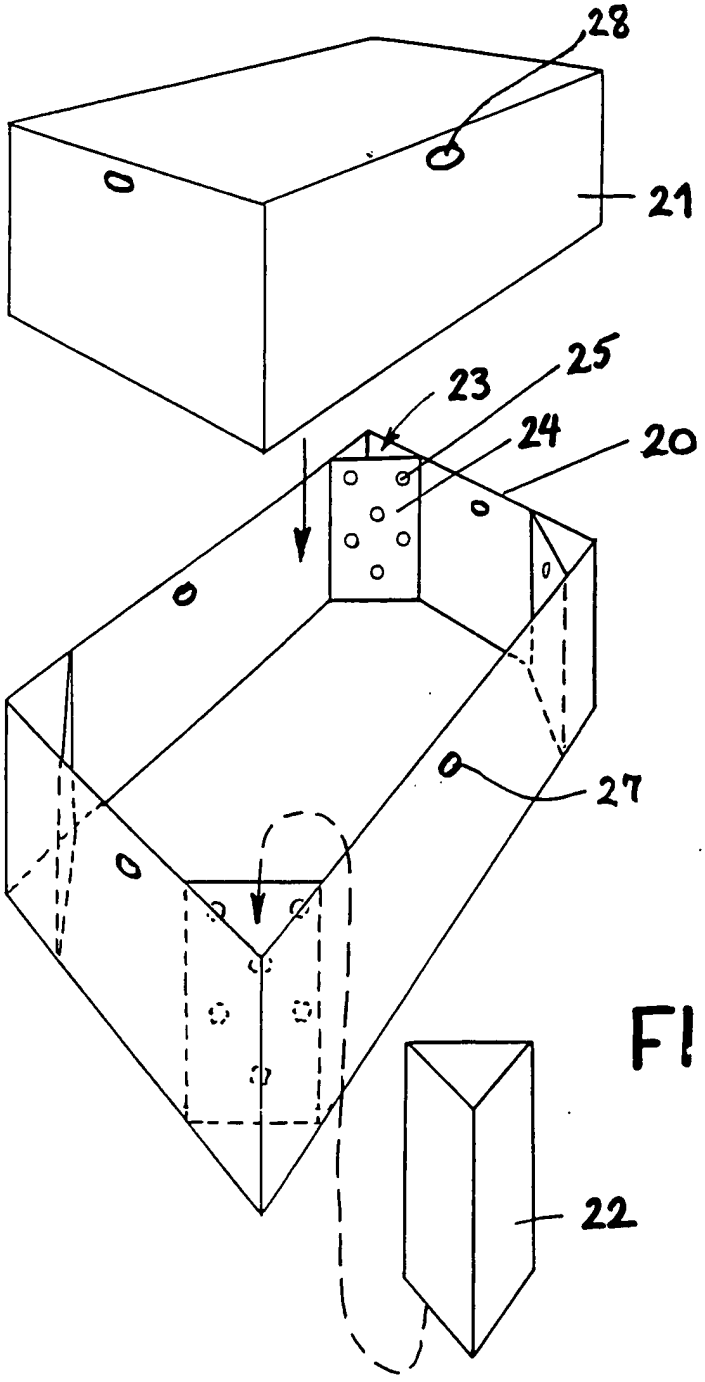


FIG.7

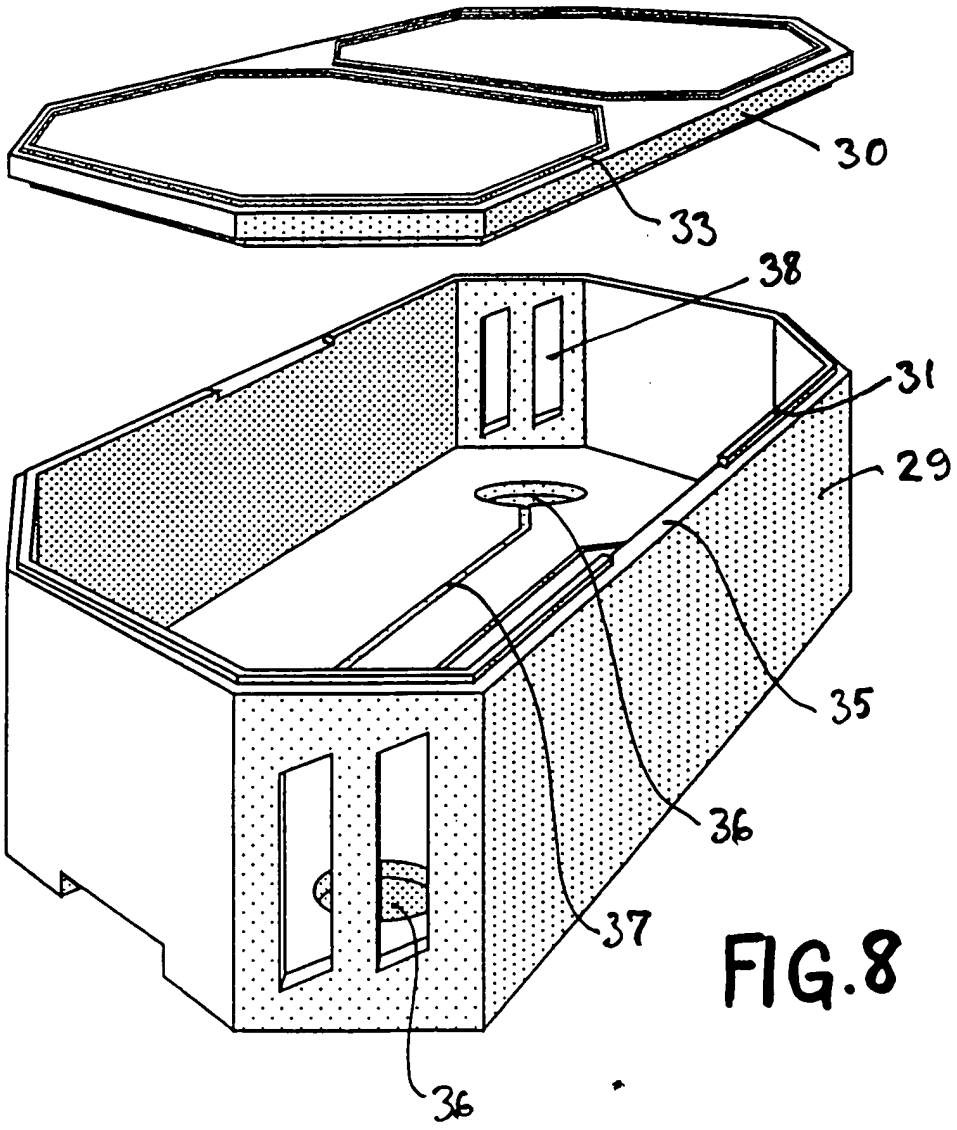


FIG.8

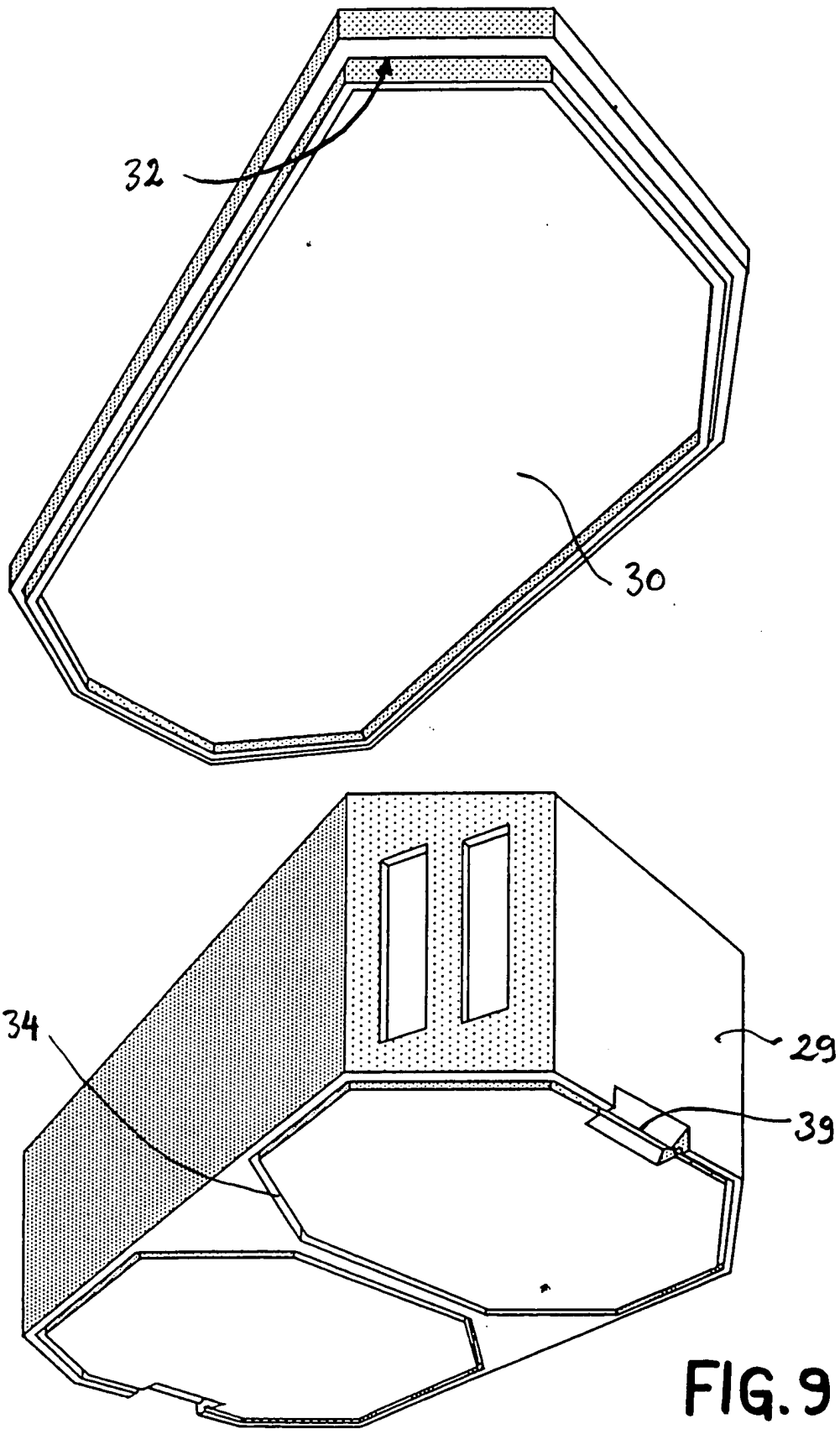


FIG.9